



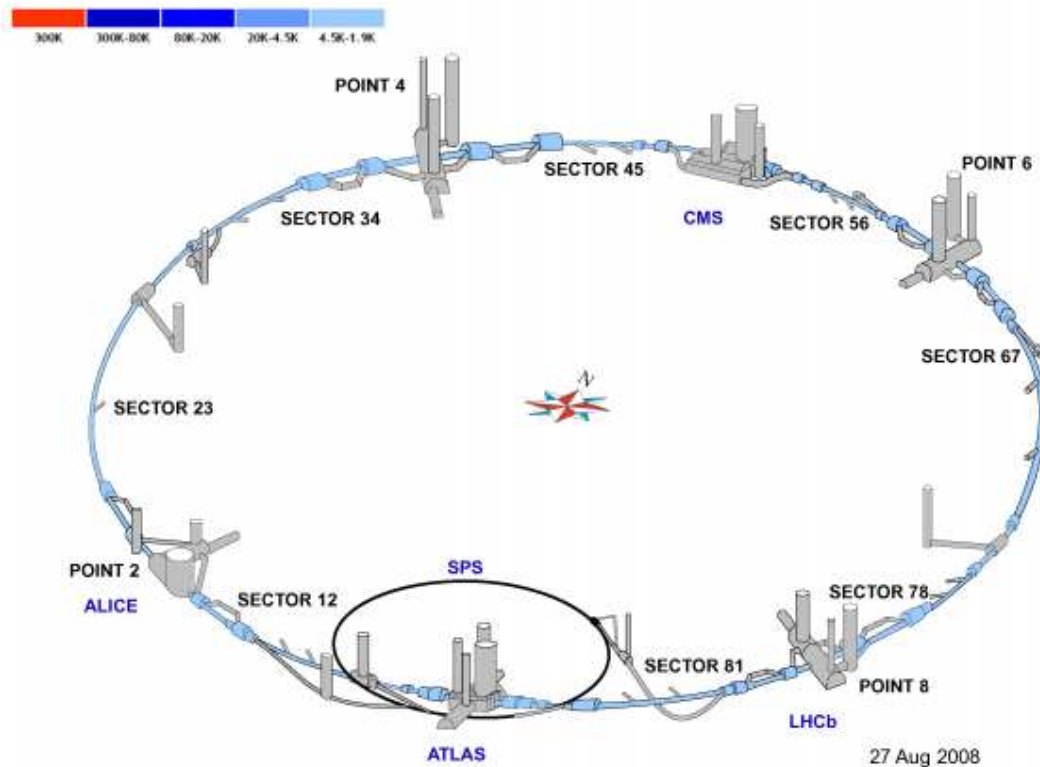
Status of the LHC and CMS

**Frank Chlebana
(Fermilab)**

**All Experimenter's Meeting
Sept 8 2008**



Status of LHC



The LHC was fully cold by mid August

We have had ~~two~~ several successful injection tests

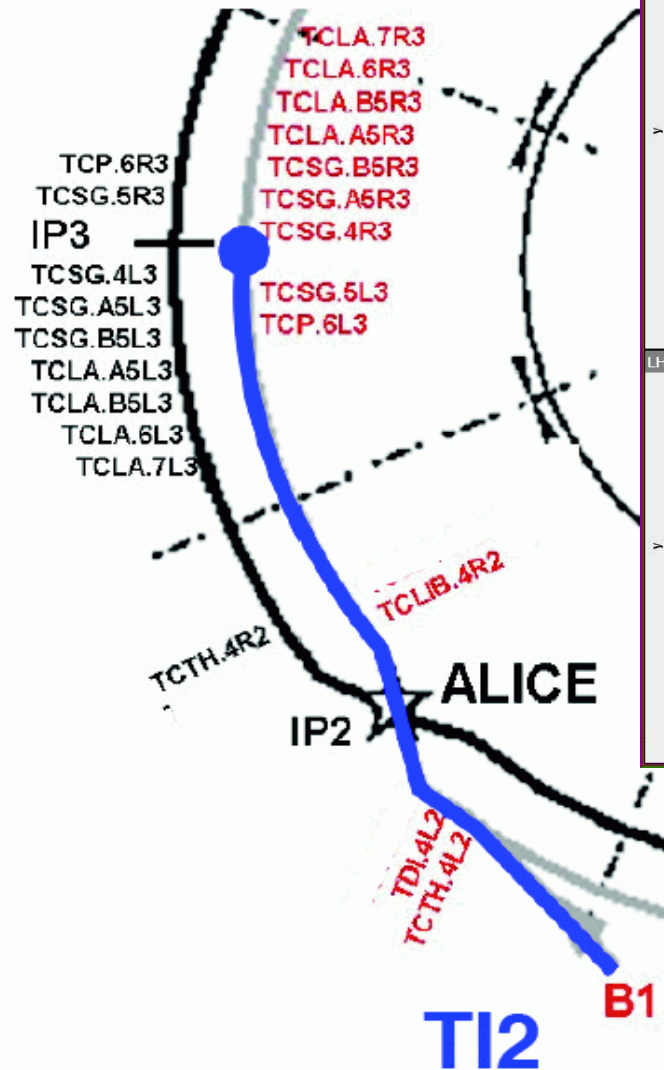
First circulating beam test scheduled for Sept 10!



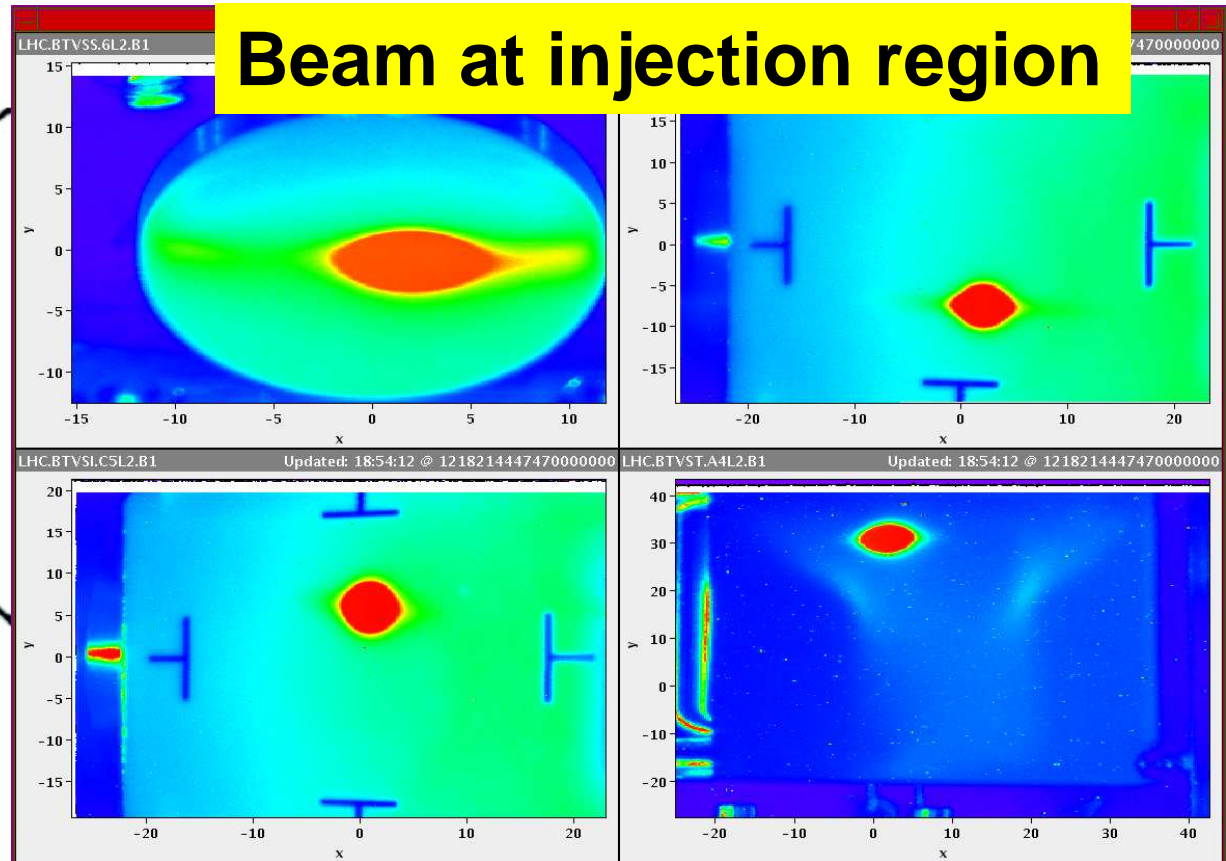
First LHC Injection Test



Aug 9/10



Beam at injection region



First Beam Induced Quench!
(main dipole in Q8/Q7 region)



Second LHC Injection Tests

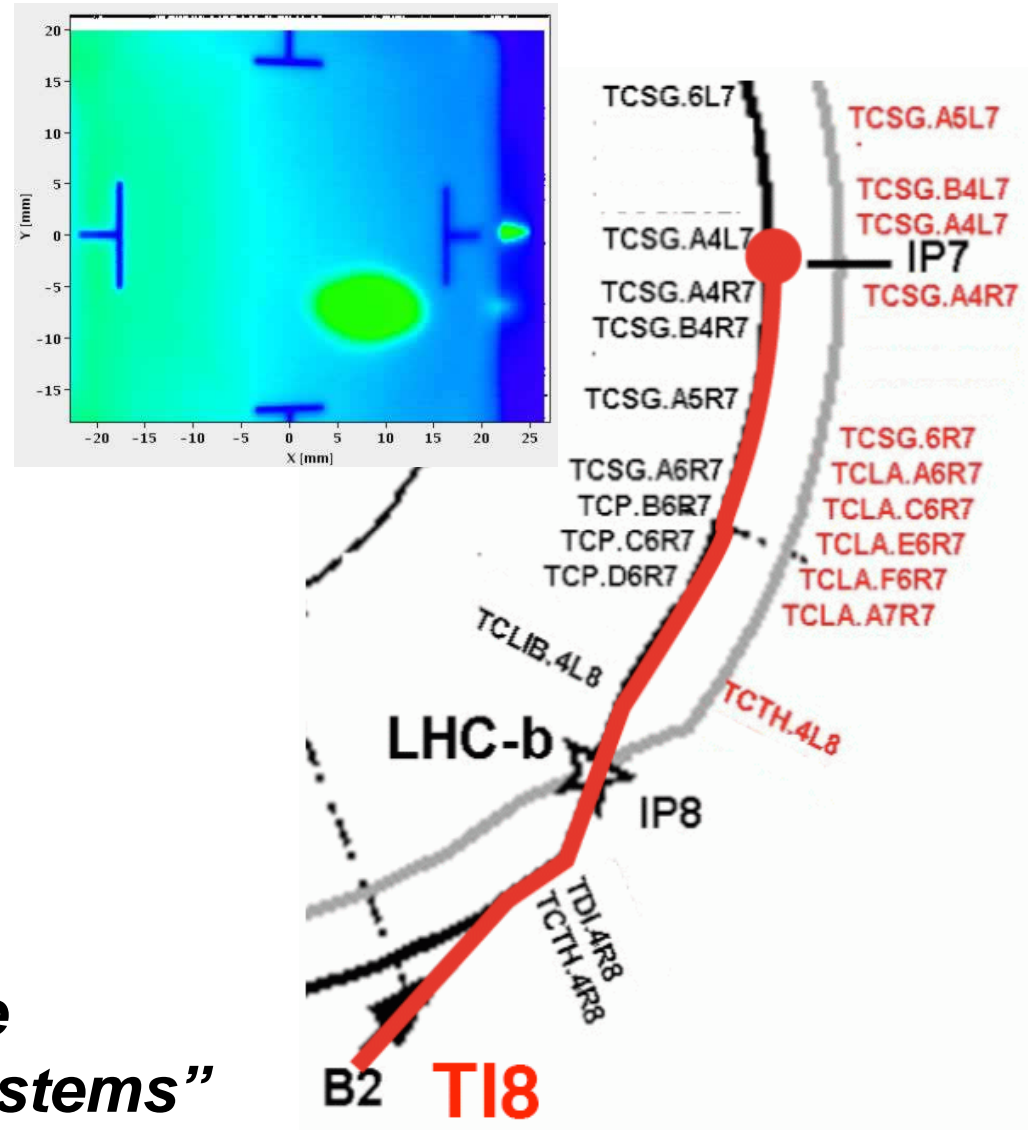


Aug 23/24

Successfully tested:

- Access system
- Aperture and Optics
- Instrumentation
- Magnet model
- Controls/Database
- Beam Transfer

*“Remarkable performance
from a huge number of systems”*





Getting Ready for Collisions



During the weekend

Beam1 through point 4 up to 150m of point5 (CMS)

Beam splash observed in CMS!

Inject Beam2 to IP6 abort dump – use magnet sweep, try kickers

Evening-nights of Sep 8, 9th

Repeat injection of Beam2 to IP6 and Beam1 to IP3 collimators

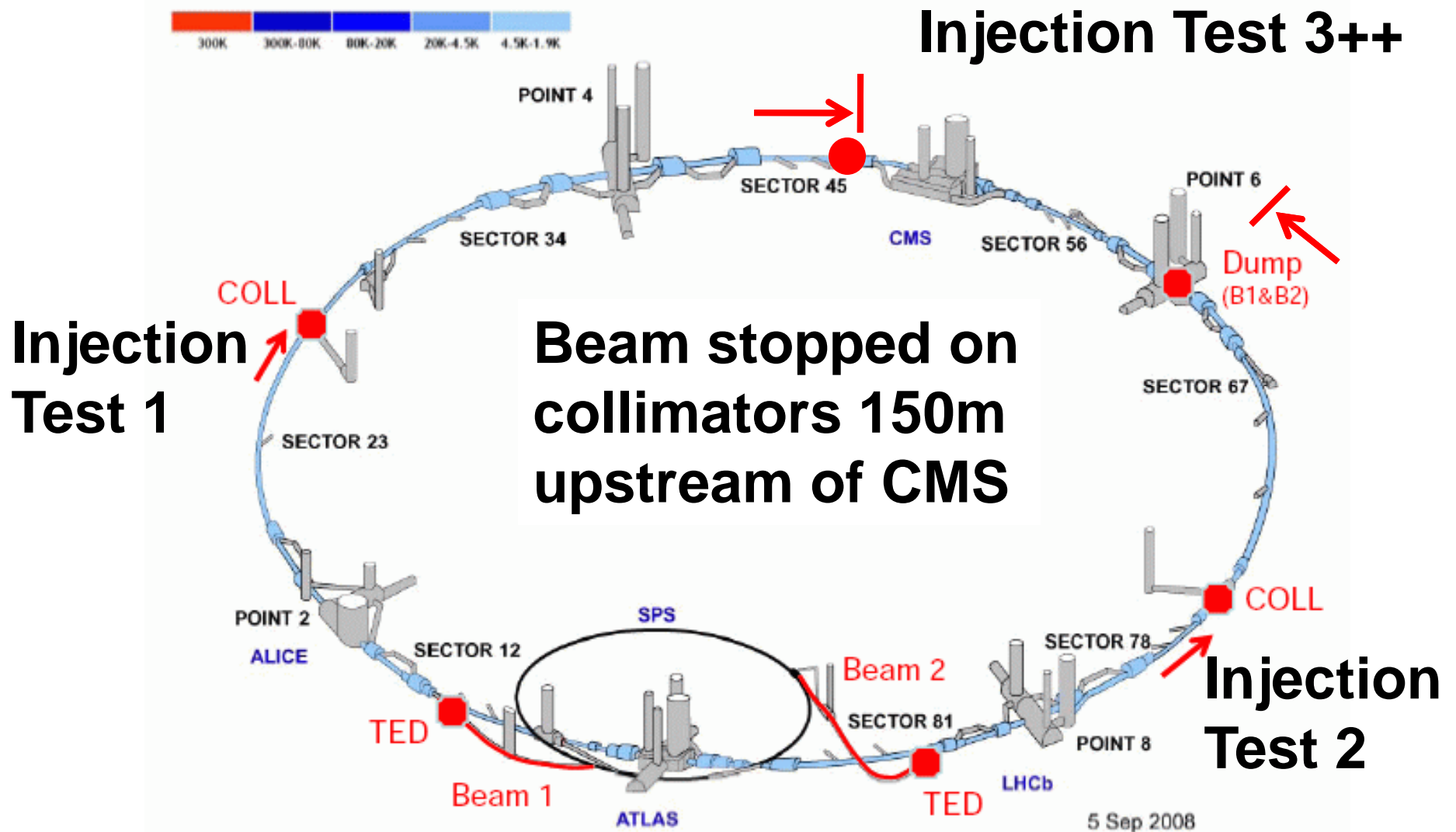
Maybe go further (Beam1 to IP6 and Beam2 to IP3)

Sept 10th

Inject Beam2, circulate and dump. Inject Beam1, circulate and dump. See the bunches. Time CMS to bunch.

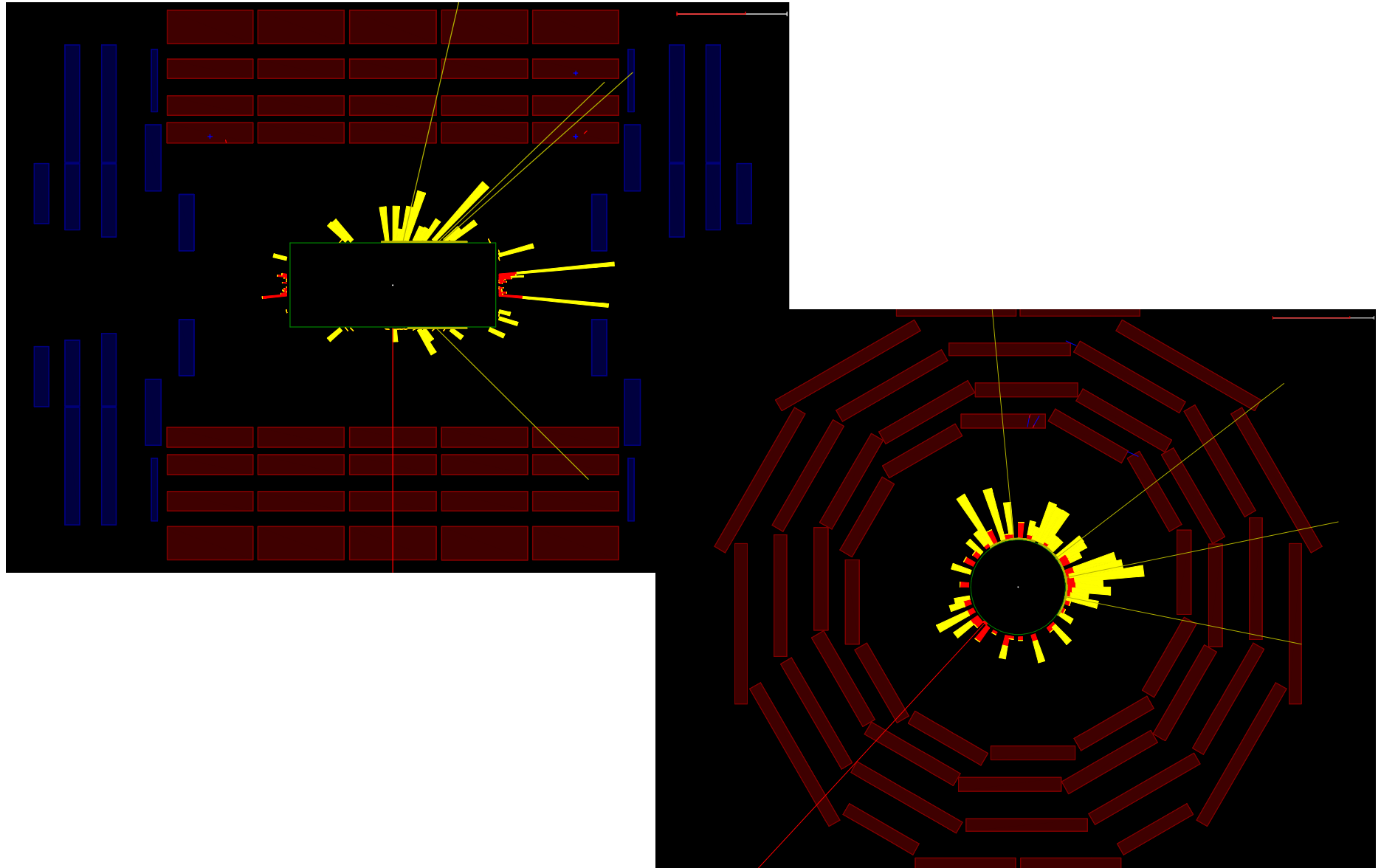
1 bunch per beam, $2\text{-}5 \times 10^9$ per bunch, 43-sec cycle

RF not ready – circulating beam will be uncaptured



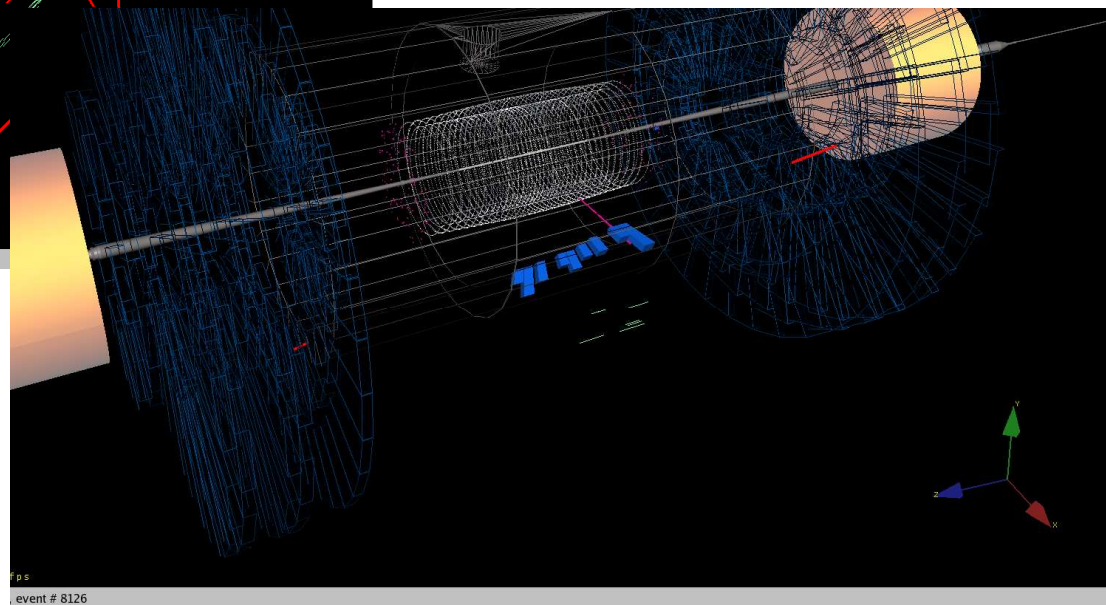
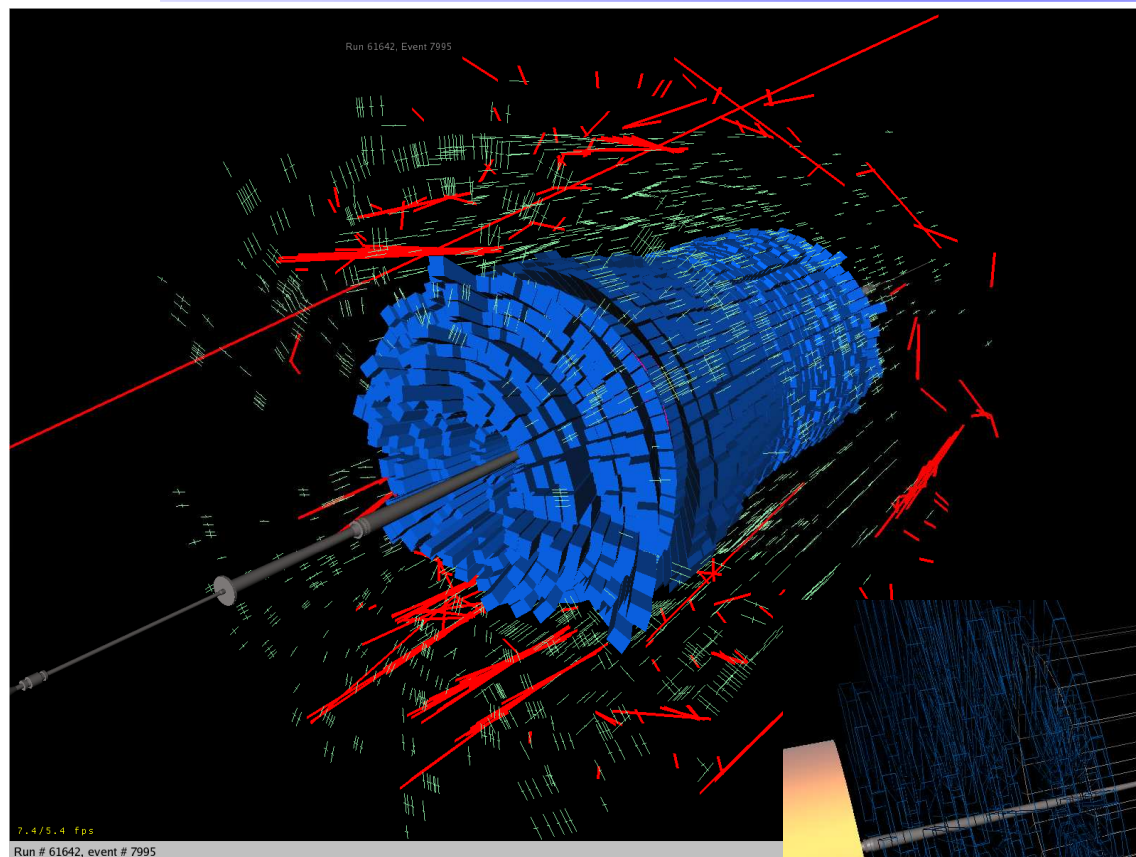


Beam Splash Events in CMS





Beam Splash Events in CMS





Getting Ready for Collisions



Sept 10 + 1 week

Inject and dump studies: aperture scans, RF capture, abort timing and alignment, multi-bunch injection, tune \rightarrow lifetime \sim hr

Bunch intensity $\geq 5 \times 10^9$

Sept 20 +/- days (*guessing...*)

**A few fills of 450 GeV collisions of a few hours each
 ~ 4 bunches per beam, bunch intensity $< \text{few } 10^{10}$**

Unsqueezed, no crossing angle, and collimators open

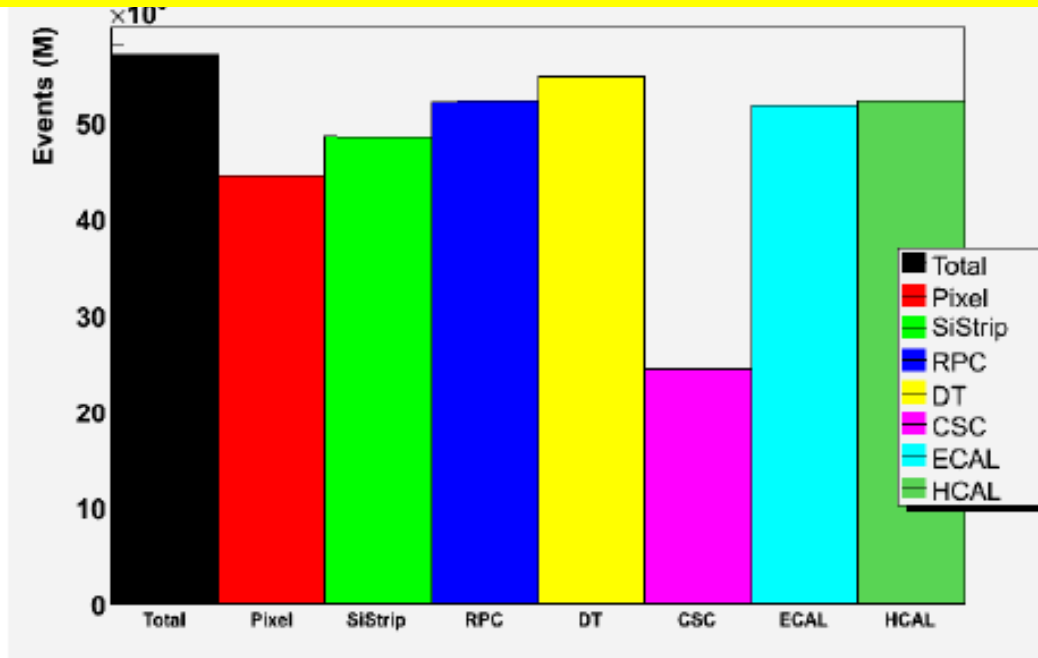
Shutdown for a few days to complete hardware commissioning before ramping



Cosmic Ray Runs at 0T



CRUZET4: Events/Subsystem



Total of ~57M events collected in 101 “good runs”

Good participation from all major components

CMS high rate tests triggered at 100kHz, sustained 66kHz with backpressure from DAQ

Readout Units running at 238 MB/s (*Design 240 MB/s*)



CRUZET4



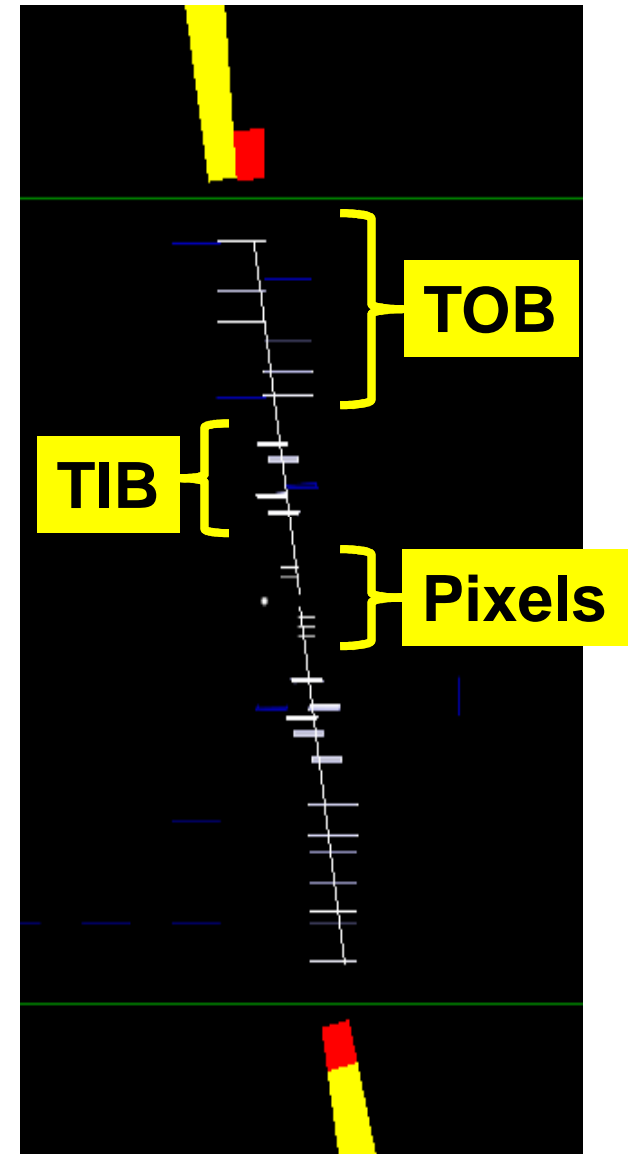
All of the tracker included in the readout
Operational fraction

TIB +TID	98.6%
TOB	99.5%
TEC+	99.5%
TEC-	99.6%
BPIX	99.2%

FPIX lost 135/4320 (3%) ROC due to a wire bond failure during transport/installation
Remaining channels 99.9%

Tracker cooling plants are operational and stable at current temperatures

Coolant leaks localized to connections at the cooling plants have been sealed



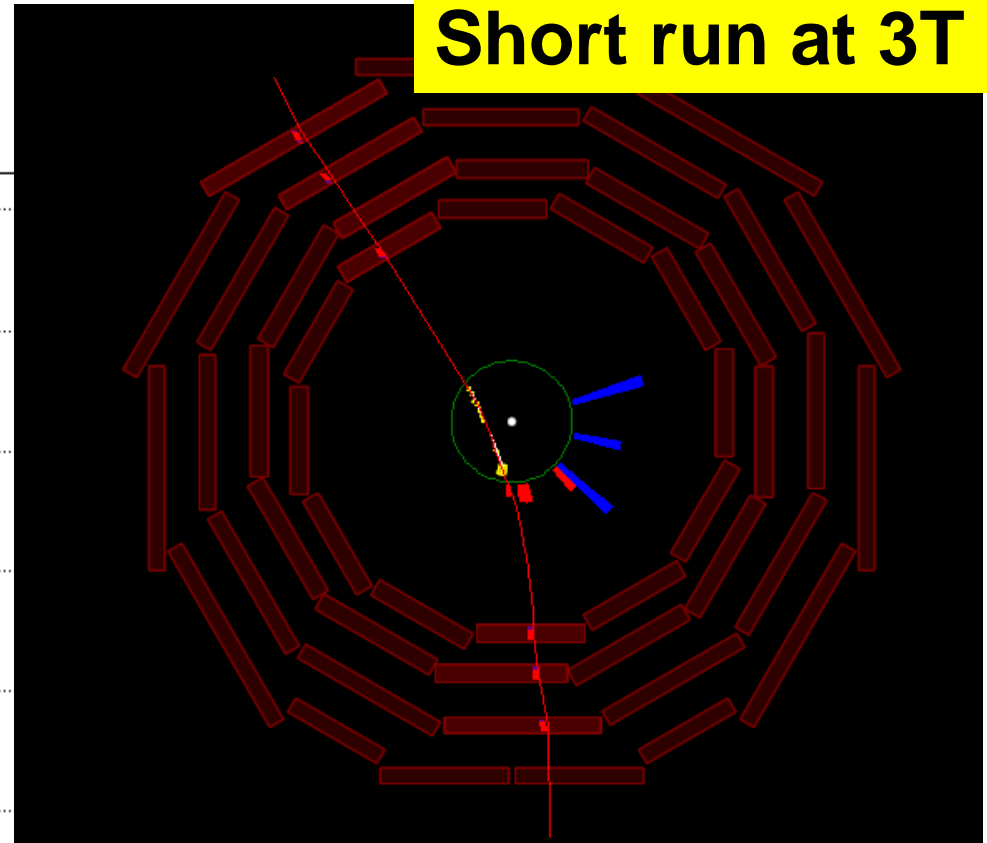
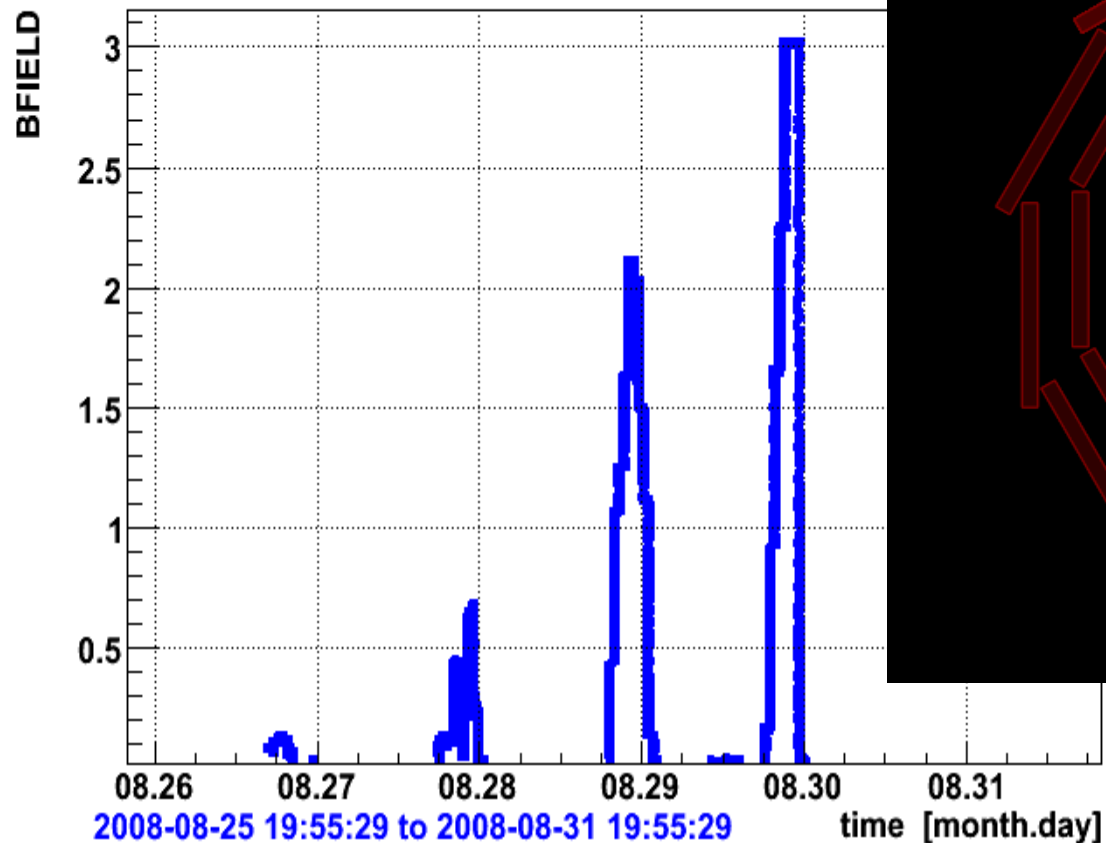


CMS Solenoid Tests



Short run at 3T

CMS_WBM.CMSFWMAGNET





CMS Getting Ready for Collisions



Both HFs closed, rotating shields closed

CMS ready for beam

Magnet ramp up to 3.8T started Monday morning

***~3T observed mechanical problem → ramp down
3.8T test postponed until after first beam***

Pumpdown going well

***Opened CMS vacuum to LHC
Closed while investigating Magnet issue***



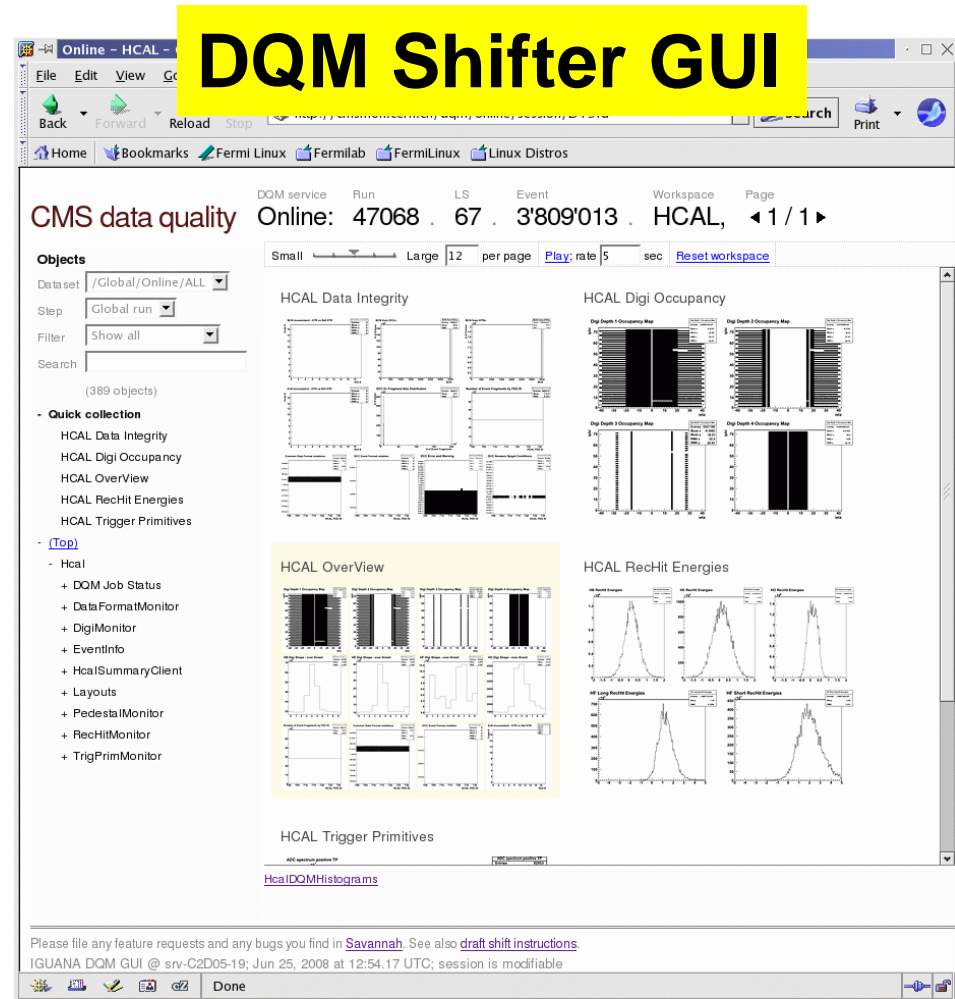
Data Quality Monitoring



Remote Operations Center is an integral part of CMS operations

Participating in online and offline DQM shifts

Providing feedback to help develop shift instructions and monitoring tools

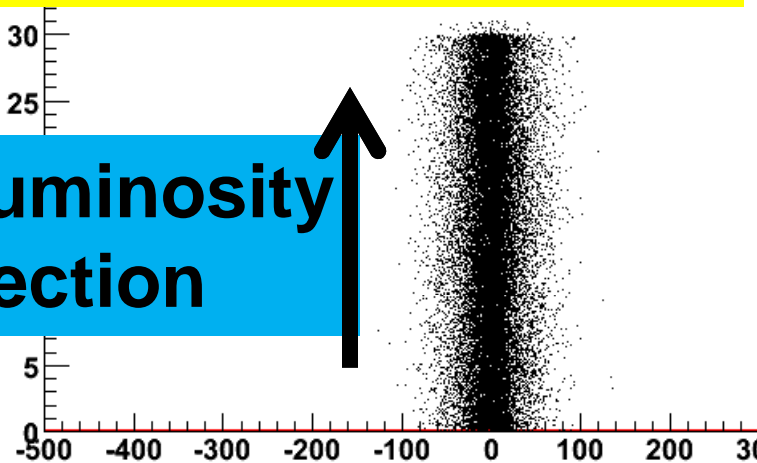


Determining Data Quality in a LS

METTask_CaloMEyNoHF_LS

Filled in POG Monitor

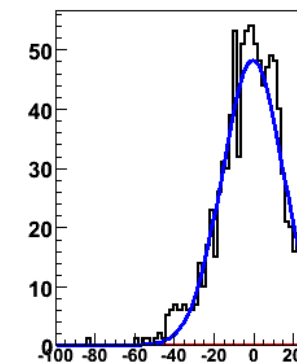
**Luminosity
Section**



Fill a 2d histogram

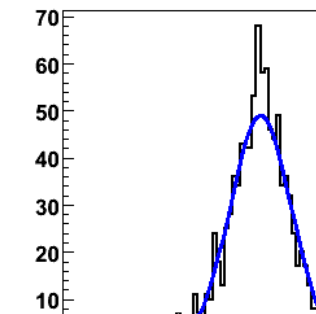
**Take projection and fit
to get mean and chi2**

METTask_CaloMEx_LS



CaloMEx_0028	
Entries	1000
Mean	-0.686
RMS	17.06
χ^2 / ndf	62.17 / 50
Prob	0.1158
Constant	48.35 \pm 2.18
Mean	-0.3872 \pm 0.5200
Sigma	15.52 \pm 0.49

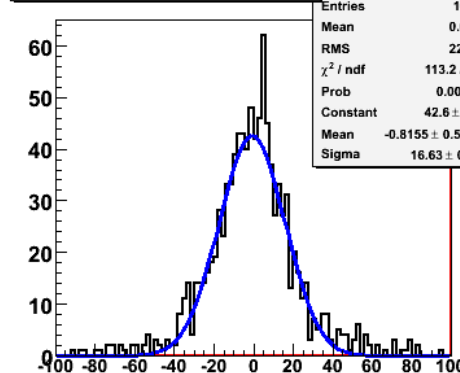
METTask_CaloMEy_LS



CaloMEy_0028	
Entries	1000
Mean	-0.728
RMS	16.68
χ^2 / ndf	53.52 / 51
Prob	0.3778
Constant	49.08 \pm 2.22
Mean	-0.01653 \pm 0.51130
Sigma	15.41 \pm 0.49

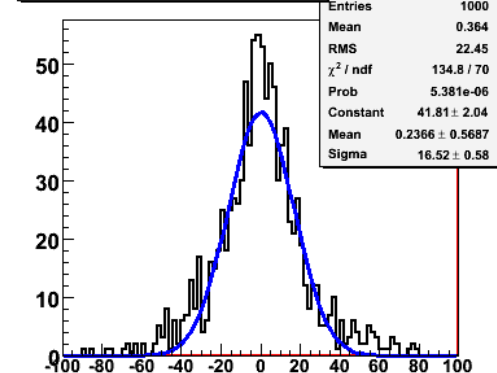
Fit by DC Algorithm

METTask_CaloMExNoHF_LS



CaloMExNoHF_0028	
Entries	1000
Mean	0.034
RMS	22.82
χ^2 / ndf	113.2 / 72
Prob	0.00141
Constant	42.6 \pm 2.0
Mean	-0.8155 \pm 0.5613
Sigma	16.63 \pm 0.53

METTask_CaloMEyNoHF_LS



CaloMEyNoHF_0028	
Entries	1000
Mean	0.364
RMS	22.45
χ^2 / ndf	134.8 / 70
Prob	5.381e-06
Constant	41.81 \pm 2.04
Mean	0.2366 \pm 0.5687
Sigma	16.52 \pm 0.58



Summary



A lot of progress made since the last AEM report
Starting to look like a real experiment

LHC appears to be working well!
All CMS subdetectors are working well!

A great deal of excitement and optimism
No major show stoppers...

Hopefully next time you will see collision data...